
**U.S. Army
Chemical Materials Agency
Program Manager for the Elimination
of Chemical Weapons**

**Explosive Destruction System
Waste Management Plan at Dugway
Proving Ground**

**Final
Revision 2**

March 2004

TABLE OF CONTENTS

Section/Paragraph	Title	Page
LIST OF TABLES		ii
1	INTRODUCTION.....	1
2	WASTE DESCRIPTIONS	2
2.1	Unpack Operation Wastes.....	2
2.2	EDS Treatment Wastes.....	3
2.2.1	Liquid Wastes	4
2.2.2	Solid Wastes.....	5
2.3	Miscellaneous Wastes.....	6
2.3.1	PDS Liquid Waste.....	6
2.3.2	Closure Rinsate and Detergent Wastes.....	7
2.3.3	Carbon Filters	7
2.3.4	Liquid Sump Waste.....	8
2.3.5	Unused Decontamination Solutions.....	8
2.3.6	PPE	8
2.3.7	Mobile Chemical Laboratory Waste.....	8
3	WASTE CHARACTERIZATION PARAMETERS	9
4	WASTE SAMPLING METHODS	10
5	FREQUENCY OF ANALYSIS	24
6	WASTE ANALYSIS RECORDS	25

LIST OF TABLES

Table	Title	Page
1	Chemical Agent Monitoring Levels for Solid Wastes.....	3
2	CWM and Treatment Reagents.....	5
3	EDS Waste Treatment Levels.....	5
4	Summary of Selected Parameters for EDS Process Wastes and Rationale for Selection	11
5	Parameters and Methods of Analysis.....	13
6	Equipment and Sampling Methods for Waste Characterization and Process Monitoring	16
7	Minimum Sample Requirements for Liquid Samples.....	18
8	Minimum Sample Requirements for Solid and Vapor Samples.....	20

1. INTRODUCTION

Waste management practices are designed to protect workers, the public, and the environment from potential hazards and provide compliance with laws and regulations pertaining to waste. Section 2 of the Destruction Plan describes the components of the Explosive Destruction System (EDS) and section 3 of the Destruction Plan describes handling activities for chemical-filled munitions and Department of Transportation (DOT) cylinders. This annex presents information on the waste streams that will be generated by EDS operations at the Dugway Proving Ground (DPG).

The EDS is an explosion and vapor containment vessel that, with attendant subsystems, can be used to treat the explosives and chemical fill in recovered chemical munitions without risk of collateral damage from blast, fragments, or chemical agent vapors.

Solid wastes resulting from EDS operations will consist of decontaminated munition body or DOT cylinder parts/fragments/rust/soil and unburned explosives. Other solid wastes will include packing material, filters, dunnage, personal protective equipment (PPE), and any solids generated as a result of spill cleanup or closure activities. Liquid wastes will consist of neutralent and rinsate resulting from the EDS treatment operations and decontamination solutions resulting from spill cleanup, personnel decontamination, and closure activities. Wastes generated from EDS operations will be characterized using process knowledge supported by sampling and analysis and will be properly identified to ensure that sufficient precautions are taken during storage, packaging, labeling, analysis, and transportation of wastes. Hazardous wastes will be managed in accordance with Resource Conservation and Recovery Act (RCRA) waste management requirements. Any waste streams potentially contaminated with chemical agent will be containerized, sampled, and analyzed for chemical agent content. After being containerized by EDS workers, the wastes will be moved to a temporary waste storage area (less than 90-day storage). The EDS System Manager will contact DPG to inform them about the waste that has been generated and to initiate DPG procedures for transporting the waste to a RCRA-permitted treatment, storage, and disposal facility

(TSDF) that has been approved to receive Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) waste for final disposition. The TSDF will be determined at a later date.

2. WASTE DESCRIPTIONS

The following paragraphs describe the wastes that will be generated during EDS operations.

2.1 Unpack Operation Wastes

The munitions and DOT cylinders currently are located in igloo G and are overpacked in specially designed chemical warfare materiel (CWM) overpack containers called multiple round containers (MRCs) and propelling charge cans (PCCs). After being brought from the igloo to the EDS, the item will be unpacked from its overpack container for placement in the EDS vessel. The empty overpacks will be retained for future use. After the item is removed, the overpack will be monitored (after decontamination, if necessary) to verify chemical agent vapors are below the level given in table 1. Only the MRCs will be retained for future use. The PCCs will be managed as waste. Air monitoring procedures are described in the Site-Specific Monitoring Plan, annex F of the EDS Destruction Plan.

Packing material may consist of plastic bags, vermiculite, and other material placed inside the overpack to keep the munition from shifting during handling. If a leaking item is encountered, the packing materials and the inside of the overpack may be decontaminated during the unpacking process. Decontaminated packing material will be repackaged in a waste drum for suitable disposition.

Suspected agent-contaminated solids will be monitored to the level shown in table 1. These levels are based on workplace time-weighted average (TWA) concentrations.

Table 1. Chemical Agent Monitoring Levels for Solid Wastes

Chemical	Level ^a mg/m ³
Mustard (H, HT, or HD measured as HD)	0.003 ^b
Sarin (GB)	0.0001 ^b

Notes:

^a Standards based on workplace exposure limits

^b Army Regulation 385-61

mg/m³ = milligrams per cubic meter

Other waste characteristics, such as the toxicity characteristic organics (D022, D028, D034, D039, D040, and D043) and toxicity characteristic metals (D004 through D011), may still apply to the treatment residues based on laboratory analysis.

Minimal decontamination will be performed on any leaking items. Typically, the leaking item will be wrapped in plastic to contain the leak and then prepared for destruction just like a non-leaking item. Any decontamination will be the minimum needed to prevent the spread of contamination to other surfaces. For example, a leaking item may be wiped down with decontamination solution using cloths, sponges, or brushes, and the leak will be bandaged. Leak stop and decontamination procedures will be carried out only to the extent necessary to prevent the spread of contamination to other surfaces. Items that are merely moist or are only leaking vapors will not be decontaminated before placement in the EDS. Therefore, there will be a minimum of decontamination wastes generated during unpacking. Waste packing material will be placed into a waste drum. Separate drums will be used for decontaminated and uncontaminated wastes.

2.2 EDS Treatment Wastes

Destruction of the explosive components of the recovered chemical munitions and treatment of chemical agent fill will occur in the EDS vessel. Both liquid and solid

wastes will be generated and may require further treatment at a permitted hazardous waste TSDF.

2.2.1 Liquid Wastes. Liquid wastes will include neutralent (product of the treatment reaction) and rinsate (from flushing the treatment vessel and piping). Neutralent and rinsate will be drained from the EDS vessel via plumbing into a liquid waste container. Neutralent and rinsate waste streams may be mixed or kept separate depending on the waste profiles that are developed. Representative samples of the liquid waste streams will be collected in sample bottles. Each bottle will be packaged into a larger container and the air inside the larger container will be monitored to verify vapor levels are below the level prescribed in table 1 before transport to the onsite laboratory for screening. Table 2 identifies the chemical agents expected to be treated in the EDS and the treatment reagents that will be used.

The chemical agents being treated include sulfur mustard (H), mustard-T mix (HT), distilled mustard (HD), and nerve agent sarin (GB). All of the mustard agents will be measured as HD. The liquid waste samples will be screened for chemical agent to determine if the defined treatment level has been achieved. Table 3 lists the treatment levels. If the treatment level has not been achieved, the agent concentration in the liquid effluent waste will be recorded.

Liquid effluent waste samples will be analyzed by gas chromatograph (GC)/flame photometric detector (FPD) or GC/mass spectrometer (MS). Quantitative analysis of liquid effluent waste samples will be performed to determine the level of residual chemical agent in the sample.

Once draining of liquid effluent waste is complete, the EDS vessel will be rinsed. If analysis of the neutralent indicates chemical agent concentrations above the treatment goal, sampling of the final water rinse will be performed. A liquid sample will be taken, similar to neutralent sampling, from the final rinsate to determine any residual levels. Rinsate analysis is performed by GC/MS. If levels are detected above the treatment

Table 2. CWM and Treatment Reagents

Chemical Warfare Materiel	Treatment Reagent
Sulfur Mustard (H, HT, HD)	Monoethanolamine (MEA) and water
Sarin (GB)	MEA and water

Table 3. EDS Waste Treatment Levels

Waste Matrix	Treatment Level ^a (mg/L)
H, HT, HD (as HD) and MEA/Water	50
GB and MEA/Water	1

Notes:

^a Nominal treatment level is system-specific; level of treatment will be determined by evaluation.

GB = sarin
H, HT, HD (as HD) = mustard agents
mg/L = milligrams per liter
MEA = monoethanolamine

goal, additional rinsing followed by liquid sampling may be instituted at the EDS System Manager's discretion. If analysis of the neutralent indicates chemical agent concentrations are below the treatment level, rinsing of the EDS vessel may still be implemented; however, analysis of the rinsate is not mandated since agent concentration below the treatment level has been demonstrated. If the treatment level has been reached, the waste drums will be moved to the temporary waste storage area. Samples for RCRA waste characterization analysis, if applicable, may be collected after the drum has been moved to the temporary waste storage area.

2.2.2 Solid Wastes. Solid wastes resulting from the EDS treatment operation will consist of decontaminated munition body or DOT cylinder parts/fragments/rust/soil and any unburned explosives. EDS treatment methods have been designed to avoid the

formation of precipitates and to remove any chemical agent heel¹ that may have existed in a recovered chemical munition. Solid materials will be removed manually from the EDS vessel using non-sparking tongs or other hand-held tools. After the solid material has been bagged (inside a waste drum), the bag will be tied shut and the void monitored for chemical agent vapors.

2.3 Miscellaneous Wastes

Additional waste streams include:

- Personnel Decontamination Station (PDS) liquid wastes
- Closure rinsate and detergent wastes
- Carbon filters
- Liquid sump waste
- PPE
- Unused decontamination agents.

2.3.1 PDS Liquid Waste. The PDS will consist of a decontamination bath and a shower. The bath will contain a mixture of bleach in water. The shower will use potable water. Workers will use the decontamination bath on their PPE if there is reason to suspect (for example, a chemical agent air monitor alarmed when handling a leaking munition) that they have been exposed to liquid agent. Liquid wastes from the decontamination station will be collected in drums. A sample of the decontamination waste will be collected and screened for chemical agent. After chemical agent concentration is verified, a RCRA characterization sample will be collected (if needed) and the waste stored in the temporary waste storage area to await sampling and

¹ Agent heels typically are polymerized H or other solidified, naturally occurring byproduct.

analysis results. When the waste has been properly characterized, the waste will be turned over to DPG for appropriate disposition.

2.3.2 Closure Rinsate and Detergent Wastes. Decontamination solution and detergent waste may be generated from closure operations. The waste solutions will be containerized, screened for chemical agent, and then sampled and analyzed for RCRA hazardous waste constituents.

2.3.3 Carbon Filters. Waste carbon filters consist of canister filters from the EDS liquid waste collection system and carbon filters from the exhaust filtration system.

2.3.3.1 Canister Filters. Two liquid waste drums are connected in series to the EDS vessel. The first drum is the liquid waste collection drum and the second provides pressure relief sizing. The second drum has a vent to release air displaced by liquid as the first drum is filled. The vent is fitted with a carbon filter canister to remove chemical agent vapors.² Once the EDS vessel has been drained and the containerized liquid is at approximately ambient temperature, the waste drum will be closed. Once the first drum in series is approximately 50 percent full, it will be replaced with an empty drum. At the conclusion of the treatment process or the determined useful life of the filter, the filter will be double bagged in plastic, placed in an appropriate waste drum, and moved to the temporary waste storage area.

2.3.3.2 Exhaust System Filters. The filters in the Vapor Containment System (VCS) are changed in a bag-in-bag-out procedure. The carbon filter consists of two elements that can be changed individually. When the chemical agent monitor located midbed in the carbon filter detects breakthrough of the first element of the filter, that element will be changed. The second element will remain in place. The filters also will be changed at the end of the useful life of the filter element and at the end of EDS operations. Once the filter has been removed, it will be double bagged and placed in an appropriate waste container. The void in the container will be monitored for chemical agent to verify vapor

² Edgewood Chemical Biological Center (ECBC), *Filtration Performance of the Explosive Destruction System's Drum Filter*, November 2000.

levels are below that given in table 1 and the drum moved to the temporary waste storage area.

2.3.4 Liquid Sump Waste. The EDS trailer has a built-in sump to collect potential spillage from filling reservoirs or leakage from the waste collection system. While opening the vessel door or taking a sample, there will be a catch tray in place to contain any spills, leaks, or other release of liquids. The sump acts as a secondary containment structure if the primary containment and catch tray fail. The sump volume is approximately 63 cubic feet, which is greater than the largest container's volume plus adequate freeboard. The waste collected in the sump will be sampled and analyzed for chemical agent. Collection of the sample will be the same as described in collection of liquid effluent waste samples.

2.3.5 Unused Decontamination Solutions. Unused solvents, reagents, and decontamination solutions will be kept for future EDS operations or packaged for disposal as a hazardous waste. These items include monoethanolamine (MEA) and bleach.

2.3.6 PPE. All contaminated PPE will be double bagged and monitored in accordance with Department of Defense (DoD) Directive 6055.9. If contamination still exists, the PPE will be decontaminated with decontamination solution. Used PPE will be decontaminated (if needed), monitored, and containerized per U.S. Army Technical Escort Unit (TEU) procedures. Reusable items will be turned in to the agency that provided them for laundering and reissue. Disposable items will be managed as waste.

2.3.7 Mobile Chemical Laboratory Waste. The onsite laboratory support operations will generate wastes that will be managed at the EDS site. These wastes will consist of decontaminated solid waste comprising laboratory trash, paper, vials, and gloves; dilute working standards in bleach (sodium hypochlorite); spent solvents (2-propanol and acetone); and decontaminated GC syringes (sharps).

3. WASTE CHARACTERIZATION PARAMETERS

Wastes generated from chemical fill materials treated during EDS operations will be characterized based upon process knowledge, analytical data, Material Assessment Review Board assessment, and air monitoring. Thus, no additional characterization is required before treatment.

Wastes generated from EDS operations will be characterized based on process knowledge, sampling and analysis, data from analysis of similar reactions, and analytical data from bench-scale demonstrations conducted during development of the EDS chemistry. The state-certified analytical laboratory performing waste characterization will, in accordance with the project quality assurance/quality control (QA/QC) program, follow its own QA/QC program when analyzing the liquid waste streams. Overall objectives of the QA/QC task are described in table 2 of the QAPjP (annex H).

Table 5 of the Sampling Plan (annex K) identifies the hazardous waste codes that may apply to the identified waste streams. Wastes generated during the cleaning and decontamination of the EDS vessel will be containerized, screened for chemical agent, and analyzed for RCRA hazard characteristics. The wastes will be turned over to DPG for final disposition, which will be based on the results of waste analysis. Wastes of uncertain content will be sampled and analyzed for characterization following standard methods appropriate for the apparent nature of the waste.

The types of waste containers to be used will be in accordance with DOT and U.S. Environmental Protection Agency (USEPA) regulations. Each waste container will be labeled in accordance with the DOT and USEPA requirements. With the exception of recyclable material, wastes will be stored in the temporary waste storage area (less than 90-day storage) pending transfer to DPG for final disposition.

4. WASTE SAMPLING METHODS

Methods used to obtain a representative sample will be consistent with guidelines specified in USEPA *Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, current edition. For each waste stream sampled, one representative sample and the appropriate quality control (QC) samples are collected for each sampling event as specified in table A-2, annex H.

After chemical agent screening has verified that the agent concentration is below the treatment level or has stabilized and the waste container is moved to the temporary waste storage area, a RCRA characterization sample will be collected. RCRA waste characterization analyses will be performed by an offsite, state-certified laboratory. The certified laboratory performing waste characterization will follow its own QA/QC program when analyzing waste samples.

Waste drums containing liquid waste will be sampled using appropriate equipment, such as composite liquid waste sampler (coliwasa). Representative samples are placed in appropriate sample bottles and sealed. Once sampling is completed, the drum thief/coliwasa is disposed of in a waste drum.

Table 4 is a summary of parameters selected for EDS process wastes and the rationale for selection. Table 5 lists the parameters/analytes of interest and the corresponding analytical methods that will be used. Table 6 lists the type of equipment and sampling methods, where appropriate, that will be used to obtain a representative sample of each waste stream. Table 7 provides the minimum sample requirements for liquid samples and table 8 provides the minimum sample requirements for solid and air samples.

The basic sampling protocols to be followed are described below:

- Samples will be obtained using the equipment and methods described in table 5. For RCRA analyses, sample containers will be supplied by the certified contract laboratory and will contain preservatives as appropriate

Table 4. Summary of Selected Parameters for EDS Process Wastes
and Rationale for Selection

Process Waste Description	Media Type	Parameters/Analytes	Rationale
H, HT, HD or GB Neutralent Wastes	L	• Chemical agent	1
		• TC metals	3
		• TC organics	3
		• Metals analysis	3
		• Organic analysis	3
		• Physical state	4
		• Corrosivity (pH)	5
		• Reactivity	6
		• Ignitability	6
		• Btu	6
		• Specific gravity	6
		• Solids content (liquids only)	6
		• Viscosity	6
		• Explosives (residual)	6
Rinsate	L	• Chemical agent	2
		• TC metals	3
		• TC organics	3
		• Metals analysis	3
		• Organic analysis	3
		• Physical state	4
		• Corrosivity (pH)	5
		• Reactivity	6
		• Ignitability	6
		• Specific gravity	6
		• Solids content	6
		• Viscosity	6
		• Oil and grease	6
Munition Body Fragments/Rust/Soil and Explosive Residues	S	• Chemical agent/industrial chemical	2, 6
Used Filters	S	• Chemical agent/industrial chemical	2
		• Physical state	4
		• Metals analysis	3
		• Organic analysis	3

Table 4. Summary of Selected Parameters for EDS Process Wastes
and Rationale for Selection (Continued)

Process Waste Description	Media Type	Parameters/Analytes	Rationale
Dunnage	S	• Chemical agent/industrial chemical	2
		• TC metals	3
		• TC organics	3
		• Metals analysis	3
		• Organic analysis	3
		• Physical state	4
		• Corrosivity (pH)	6
		• Reactivity	6
		• Ignitability	6
		• Btu	6
		• Percent ash	6

Notes:

Rationale:

- 1 Determine the concentration of chemical agent or industrial chemical, as appropriate, to verify treatment effectiveness and for proper characterization before transportation to a permitted hazardous waste treatment, storage, and disposal facility (TSDF).
- 2 Determine presence or absence of chemical agent or industrial chemical as applicable. Ensure safe handling, treatment, and disposition.
- 3 Ensure safe handling and proper characterization before transportation to a permitted hazardous waste TSDF. Determine land disposal restrictions (LDRs) and treatment standards applicable to the waste, including identification of underlying hazardous constituents.
- 4 Ensure proper handling and disposition.
- 5 Determine if waste is characteristically corrosive and ensure safe handling and disposition. Determine applicable treatment standards and LDRs.
- 6 Criteria may be required for approval and acceptance at a TSDF to ensure appropriate treatment and waste acceptability. Not all criteria listed for a particular waste stream may be required, and the parameters and analysis performed will depend on the requirements of the TSDF that will receive the waste for final treatment and disposal.

Btu = British thermal units
GB = sarin
H, HT, HD = mustard agents
TC = toxicity characteristic

Table 5. Parameters and Methods of Analysis^{a,b}

Parameter/Analyte	Method of Analysis ^c
Chemical Agents in Neutralents and Rinsate	U.S. Army Test Methods ^d
Chemical Agents in Waste Decontamination Solutions, Rinsewaters at Closure	U.S. Army Test Methods ^d
Chemical Agents in Solids	Vapor analysis using near real-time (NRT) monitors or Tedlar [®] bag samples analyzed by GC/MS and process knowledge for safety purposes
Ignitability	Process knowledge or Method 1010 or 1020A
Corrosivity (pH)	Method 9040B or 9041A (for liquid samples), 9045C (for solid sample matrices)
Reactivity (cyanides, sulfides, inorganic fluorides)	Process knowledge or Method SW-846 Chapters 7.3.3.2, 7.3.4.2, and Method 9214
Physical State	Process knowledge and/or visual inspection
Oils and Grease	Method 9070A or 9071B
Solids Content (total suspended and total dissolved)	EPA 160.1 and 160.2 ^e
Btu (heat of combustion)	Method 5050 or ASTM D5468-02
Percent Ash	ASTM D5468-02
Specific Gravity	ASTM D4052-96, D1429-95, D1217-93, or D5057-90
TC Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver)	Method 1311 (solids only) extraction followed by 6010B, 6020, or one or more of the following methods
Arsenic	7060A/7061A/EPA206.3 ^e
Barium	7080A/7081/EPA208.1 ^e
Cadmium	7130/7131A/EPA213.1 ^e
Chromium	7190/7191/EPA218.1 ^e
Lead	7420/7421/EPA239.1 ^e
Mercury	7470A/7471A/EPA245.2 ^e
Selenium	7740/7741A/EPA270.3 ^e
Silver	7760A/7761/EPA272.1 ^e
TC Organics (volatiles, semivolatiles, pesticides, herbicides)	Process knowledge (pesticides and herbicides) and Method 1311 (solids only) and 8260B, 8270C, 8081A, 8151A

Table 5. Parameters and Methods of Analysis^{a,b} (Continued)

Parameter/Analyte	Method of Analysis ^c
Metals Analysis (aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, thallium, tin, vanadium, zinc)	Process knowledge or Method 6010B, 6020, or one of the following methods:
Aluminum	7020/EPA202.1 ^e
Antimony	7040/7041/EPA204.1 ^e
Arsenic	7060A/7061A/EPA206.3 ^e
Barium	7080A/7081/EPA208.1 ^e
Beryllium	7090/7091/EPA210.1 ^e
Cadmium	7130/7131A/EPA213.1 ^e
Chromium	7190/7191/EPA218.1 ^e
Cobalt	7200/7201/EPA219.1 ^e
Copper	7210/7211/EPA220.1 ^e
Iron	7380/7381/EPA236.1 ^e
Lead	7420/7421/EPA239.1 ^e
Manganese	7460/7461/EPA243.1 ^e
Mercury	7470A/7471A/EPA245.2 ^e
Molybdenum	7480/7481/EPA246.1 ^e
Nickel	7520/7521/EPA249.1 ^e
Thallium	7840/7841/EPA279.1 ^e
Tin	7870/EPA282.1 ^e
Vanadium	7910/7911/EPA286.1 ^e
Zinc	7950/7951/EPA289.1 ^e
Explosive Residues	Process knowledge, Method 8330, or published Army method
Volatile Organics Analysis	Process knowledge or Method 8260B
Semivolatile Organics Analysis	Process knowledge or Method 8270C
Pesticides	Process knowledge or Method 8081A
Herbicides	Process knowledge or Method 8151A
Total Halogenated Organics	Process knowledge or Method 9020B

Table 5. Parameters and Methods of Analysis^a (Continued)

Notes:

- ^a With the exception of chemical agent, not every parameter/analyte listed will be sampled and analyzed. Selection of a parameter/analyte for sampling and analysis will depend on treatment, storage, and disposal facility (TSDF) waste acceptance requirements.
- ^b Samples will be analyzed in a state-certified laboratory, or in the case of chemical agent analysis, by the onsite laboratory. For samples analyzed by an Arkansas-certified laboratory, methods used will have a current certification.
- ^c Methods are from *Test Methods for Evaluating Solid Waste Physical/Chemical Methods*, SW-846, current edition, unless otherwise specified.
- ^d ECBC SOP Number-CR4-2NP0001 and IOP number MT-8.
- ^e Methods are from *Methods for Chemical Analysis of Water and Wastes*, EPA 600/4-79-020, current edition.
- ^f EAI developed "Mass Selective Detector"

ASTM = American Society for Testing and Materials
Btu = British thermal units
EPA = Environmental Protection Agency
GC/MS = gas chromatograph/mass spectrometer
MEA = monoethanolamine

Table 6. Equipment and Sampling Methods for Waste Characterization and Process Monitoring

Media and Waste Stream	Sample Type	Method and Equipment	Frequency
<u>Vapor</u>			
Air Monitoring of Solids Munition Bodies and Fragments Spent Carbon Filters Dunnage Personnel Protective Clothing	Grab	Solids are containerized in DOT containers equipped with sampling ports or encased in plastic. The solids are allowed to vent into the container or plastic for 4 hours at a temperature equal to or greater than 70°F. A sample of the vapors is collected using DAAMS or MINICAMS®. DAAMS samples are analyzed at the onsite laboratory.	Each container generated
<u>Liquid</u>			
Neutralent (for Agent Screening)	Grab	Collect liquid sample from discharge line or waste drum using a coliwasa.	Each batch or drum of neutralent waste generated
Neutralent (for RCRA Characterization)	Grab	Collect liquid sample from waste drum using a coliwasa.	Each drum generated
Rinsate (for Agent Screening)	Grab	Collect liquid sample from waste drum using a coliwasa.	Each drum generated for each item treated
Rinsate (for RCRA Characterization)	Grab	Collect liquid sample from waste drum using a coliwasa.	Each drum generated

Table 6. Equipment and Sampling Methods for Waste Characterization and Process Monitoring (Continued)

Media and Waste Stream	Sample Type	Method and Equipment	Frequency
<u>Solid</u>			
Munition Body Fragments	N/A	Agent screening will be by vapor monitoring. RCRA characterization will be based on knowledge of the composition of the munition casings.	Each item treated in the EDS
Explosive Residues	N/A	Agent screening will be by vapor monitoring. RCRA characterization will be based on knowledge of the composition of the munition casings and associated explosives.	Each item treated in the EDS
Used Filters	N/A	Containers of used filters are monitored for agent using air-monitoring techniques. RCRA characterization based on knowledge of filter composition and process knowledge.	Each container generated
Dunnage	Composite Grab	Collect representative sample of dunnage at time of generation.	Once whenever unknown or undefined dunnage waste is generated

Notes:

coliwasa = composite liquid waste sampler
DAAMS = Depot Area Air Monitoring System
DOT = Department of Transportation
EDS = Explosive Destruction System
N/A = not applicable
RCRA = Resource Conservation and Recovery Act

Table 7. Minimum Sample Requirements for Liquid Samples

Parameter/Analyte	Size	Container Type	Preservative ^a	Holding Time ^{b,c}	Sample Volume
Chemical Agents	125 mL	Amber glass, Teflon [®] -lined cap	4°C	7 days ^d	125 mL
Volatile Organics	40 mL	Glass vial, Teflon-lined cap	4°C, pH <2 with 1:1 HCl	14 days	3 to 40 mL
TC Volatile Organics	120 mL	Amber glass vial, Teflon-lined cap	4°C, pH <2 with 1:1 HCl	Extract within 14 days (solids <0.5%), analyze extract within 14 days	120 mL minimal void
Semivolatile Organics	1 L	Amber glass vial, Teflon-lined cap	4°C	Extract within 7 days, analyze extract within 40 days	1 L per analysis
TC Semivolatile Organics	1 L	Amber glass vial, Teflon-lined cap	4°C	Extract within 7 days, analyze extract within 40 days	1 L per analysis
All Metals/Cations ^a	1 L	P, G	HNO ₃ to pH <2	180 days, 28 days for Hg in glass	1 L
TC Metals	1 L	P, G	4°C	180 days, 28 days for Hg in glass	1 L
Corrosivity (pH)	125 mL	P	4°C	Analyze immediately	125 mL
Ignitability	500 mL	G	4°C	14 days	500 mL
Fluoride	125 mL	P	4°C	28 days	125 mL
Sulfide, Reactive	250 mL	G	pH >9, NaOH/zinc acetate	7 days	250 mL
Cyanide, Reactive	250 mL	G	NaOH, pH >9	7 days	250 mL

Table 7. Minimum Sample Requirements for Liquid Samples (Continued)

Parameter/Analyte	Size	Container Type	Preservative ^a	Holding Time ^{b,c}	Sample Volume
Suspended Particulates	500 mL	P	4°C	7 days	500 mL
Oil and Grease	1 L	G	4°C	28 days	1 L

Notes:

- ^a For GB samples, acid preservative will not be added for volatile organics, TC volatile organics, and total metals.
^b Holding time for chemical agent analysis is from U.S. Army test method. Holding times for other analyses are from the date of collection as referred to in Federal Register, Vol. 49, No. 209, October 26, 1984, as applicable.
^c Holding time for GB samples collected for volatile organics, TC volatile organics, and total metals will be 7 days.
^d Holding time requested by State of Utah
^e Chromium⁶ analysis will not be conducted.

G = glass
HCl = hydrochloric acid
Hg = mercury
HNO₃ = nitric acid
L = liter
mL = milliliter
NaOH = sodium hydroxide
P = polyethylene
TC = toxicity characteristic

References: U.S. Army (for chemical agent parameters)
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, current edition

Table 8. Minimum Sample Requirements for Solid and Vapor Samples

Parameter/Analyte	Size	Container Type	Preservative	Holding Time ^a	Sample Volume
Volatile Organics	120 mL	Amber glass jar (WM), Teflon [®] -lined cap	4°C	14 days	100 g (minimum void)
TC Volatile Organics	500 mL	Amber glass jar (WM), Teflon-lined cap	4°C	14 days to ZHE, 14 days from ZHE to analysis	200 g (minimum void)
TC Semivolatile Organics	1 L	Amber glass jar (WM), Teflon-lined cap	4°C	Extract within 14 days to NVE, 7 days to extract the extract. Analyze extract within 40 days.	1 kg per analysis
Semivolatile Organics	250 mL	Amber glass jar (WM), Teflon-lined cap	4°C	Extract within 14 days to NVE, 7 days to extract the extract. Analyze extract within 40 days.	200 g
All Metals/Cations ^b	250 mL	Glass jar (WM)	4°C	180 days, 28 days for Hg	200 g
TC Metals	500 mL	Amber glass jar (WM), Teflon-lined cap	4°C	Analyze extract within 180 days, 28 days for Hg	400 g
pH	100 mL	Glass (WM)	4°C	Analyze immediately	50 g
Free Liquids	250 mL	Glass (WM)	4°C	N/A	100 g
Fluoride	250 mL	Glass (WM)	4°C	28 days	200 g
Cyanide, Reactive	200 mL	Glass	N/A	N/A	200 g
Sulfide, Reactive	250 mL	Glass (WM)	4°C	N/A	200 g

Table 8. Minimum Sample Requirements for Solid and Vapor Samples (Continued)

Parameter/Analyte	Size	Container Type	Preservative	Holding Time ^a	Sample Volume
Corrosivity/Ignitability	500 mL	Glass	4°C	N/A	500 g
Chemical Agent Vapor	Variable	Tedlar [®] Bag or equivalent	4°C	Analyze immediately	Variable

Notes:

- ^a With the exception of chemical agent analysis, holding times are from the date of collection as referred to in Federal Register, Vol. 49, No. 209, October 26, 1984, as applicable.
- ^b Chromium⁶ analysis will not be conducted.

g = gram
Hg = mercury
kg = kilogram
L = liter
mL = milliliter
N/A = not applicable
NVE = non-volatile extractables
TC = toxicity characteristic
WM = wide mouth
ZHE = zero headspace extraction

References: U.S. Army (for chemical agent parameters)
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, current edition

for the analyte of interest. Samples will be collected using a precleaned or disposable sampler or using the sampling port or sampling lines located on the EDS vessel or waste container.

- Sample containers may be filled in the following sequence, as applicable: chemical agent, then volatile organic vapors, volatile organics, semivolatile organics, metals, ignitability, pH (corrosivity), and reactivity parameters after chemical agent screening.
- Chemical agent screening samples will be analyzed before shipping samples for RCRA analysis. RCRA samples will not be released to the offsite laboratory unless chemical agent concentrations meet the laboratory pre-defined acceptance levels for agent concentration.
- Label all sample containers.
- Properly clean, decontaminate, and monitor the exterior of sample containers. Clean, decontaminate, and monitor sampling hardware (if necessary) and dispose of waste properly.
- Custody-seal sample containers, place containers in a leak-tight polyethylene bag, and place samples in a durable ice-filled cooler or comparable receptacle for transport to the laboratory. The sample containers may be individually wrapped in blister wrap or other protective material prior to placement in the cooler or comparable receptacle, if necessary.
- Complete the chain-of-custody and request-for-analysis forms. Retain a copy for project files.
- Review all paperwork and enclose the forms in a leak-tight, polyethylene bag placed inside the cooler or other comparable receptacle.

- Seal the cooler or comparable receptacle and mark in accordance with DOT requirements as applicable.
- Transport samples to the onsite analytical laboratory for chemical agent or industrial chemical screening or shipment offsite to a state-certified analytical laboratory for RCRA analysis. Samples shipped to offsite laboratories will be transported via overnight courier to ensure delivery within 24 hours of sample collection.

The Quality Assurance Project Plan (annex H, section 6, to the EDS Destruction Plan) contains more information about sample identification and chain-of-custody procedures.

Sampling procedures are designed to ensure that each sample will be accounted for at all times. The primary objectives of the sample control procedures are as follows:

- Each sample collected for analysis will be uniquely identified.
- Important and necessary sample constituents will be preserved (for example, refrigerated).
- Samples are protected from loss, damage, or tampering.
- Any alteration of samples during collection or shipping (for example, preservation) will be documented.
- A record of sample custody and integrity will be established that will be legally defensible.
- The correct samples will be analyzed and will be traceable to the applicable data records (for example, chain-of-custody, field records, request for analysis, laboratory ledgers).

Sample collectors will maintain a logbook of sampling activities. The logbook typically will include the following: purpose of sampling, date and time of collection, sample number, sampling location, sampling methodology, container description, waste description, description of process originating the waste, number and volume of samples, field observations, field measurements, destination and transporter, and signature of collector.

A chain-of-custody record will accompany samples at all times. Personnel collecting samples will be responsible for initiating and following chain-of-custody procedures and initiating sample custody records in the field at the time samples are collected. A chain-of-custody record form will serve two purposes: (1) will document sample collection activities including sampling site, sample identification, number of samples, and date and time of collection; and (2) will document chain-of-custody, including names of responsible individuals and dates and times of custody transfers.

Transportation of samples will be performed in accordance with DOT, USEPA, and Army requirements. Hazardous waste samples will be properly packaged, marked, and labeled. Shipping papers will be prepared as required by DOT regulations, USEPA requirements, and Army regulations and guidelines.

As applicable, equipment used to sample waste materials will be disposable or designed for easy decontamination. Contaminated disposable equipment will be managed as hazardous waste, as appropriate. Cleanable equipment will be thoroughly decontaminated prior to reuse. Spent decontamination solutions will be managed as hazardous waste.

5. FREQUENCY OF ANALYSIS

Chemical agent screening will be performed on every drum of neutralent and on the first three drums of rinsate. Each drum of solid waste will be monitored for chemical agent vapors.

RCRA waste characterization sampling will be performed for each drum generated for each liquid waste stream. Additional samples may be collected and analyzed to meet the requirements of the TSDF that will receive the waste. Samples will be representative and will reflect all variables inherent in the generation process.

RCRA characterization of solid wastes will be based on knowledge of the material in the waste stream (for example, composition of the munition body fragments). For wastes of undefined composition (for example, unknown dunnage), samples will be collected and analyzed by the USEPA Toxicity Characteristic Leaching Procedure (TCLP).

6. WASTE ANALYSIS RECORDS

The Product Manager for Non-Stockpile Chemical Materiel (PMNSCM) maintains a record system that includes documentation of all samples collected and analyzed, analyses conducted, preparations, QC challenges, maintenance of laboratory equipment, and reports prepared. All information is kept for a minimum of 3 years by DPG.(This page intentionally left blank.)